REMARKS

This amendment is being submitted in response to the Final Office Action dated December 27, 2005 and concurrent with a Request for Continued Examination (RCE). In the Final Office Action, claims 1-4, 7-23, 25-34 and 36-42 were rejected. By the present Response, claims 1-3, 12, 19, 34, 37 and 38 are amended to particularly point out embodiments for protection. Upon entry of the amendments, claims 1-4, 7-23, 25-34, and 36-42 will be pending in the present patent application. Reconsideration and allowance of all pending claims are requested in light of the above amendments and in view of the arguments summarized below.

Rejections Under 35 U.S.C. §112

Claim 1-4 and 7-17

Claims 1-4 and 7-17 stand rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In addition, the Examiner stated that in claim 1, the limitation "desirable", both for the F/D ratio and the depths, is a vague and indefinite open-ended limitation and that the bounds of "desirable" are unclear.

Applicants respectfully submit that support for the term "desirable F/D ratio" and "desirable depths" may be found in paragraphs [0046]-[0048]:

> With reference to FIGS. 7-9, illustrations of various ultrasonic scanning beams producing characteristic focal zones, in accordance with embodiments of the present disclosure are shown. As seen in FIG. 7, array 100 includes a plano-concave lens 108a configured and dimensioned to produce a *constant F/D ratio* over the operating range of array 100. In particular, lens 108a is configured and dimensioned to manipulate ultrasonic beams 110 to produce *uniform sized focal zones "F"* in scanning beam 106. As will be appreciated, a F/D ratio may be defined as a ratio of the focal

> length of the plano-concave lens to its diameter. It describes the basic geometric architecture of the plano-concave lens, which affects its physical size, its design and its electrical performance. (Emphasis added).
>
> As seen in FIG. 8, array 100 includes a plano-concave lens 108b configured and dimensioned to produce an increasing F/D ratio over the operating range of array 100. In particular, lens 108b is configured and dimensioned to manipulate ultrasonic beams 110 to produce *increasing sized and/or diverging focal zones "F"* in scanning beam 106. (Emphasis added).
>
> As seen in FIG. 9, array 100 includes a plano-concave lens 108c configured and dimensioned to produce a *decreasing F/D ratio* over the operating range of array 100. In particular, lens 108c is configured and dimensioned to manipulate ultrasonic beams 110 to produce *decreasing sized and/or converging focal zones "F"* in scanning beam 106. (Emphasis added).

Applicants wish to bring to the attention of the Examiner that support for the term "desirable F/D ratio" may be found in the paragraphs reproduced hereinabove. For example, the transducer array may include a plano-concave lens configured and dimensioned to produce a desirable F/D ratio, where the *desirable F/D ratio* may include one of a constant F/D ratio, an increasing F/D ratio or a decreasing F/D ratio, as illustrated in FIGs. 7-9 respectively.

Additionally, Applicants respectfully submit that support for the term "desirable depths" may also be found in the paragraphs reproduced hereinabove and also in paragraphs [0038]-[0039]:

> Accordingly, in use, aperture 104 of array 100 can be sized and focal laws applied in both the X and Z directions. In addition, as seen in FIGS. 3 and 4, array 100 is configured for electronic scanning in the X direction and is able to *produce focal points*

> *and/or zones "F_{1-3}" at varying levels and/or depths* in both the X-Y and Z-Y planes. (Emphasis added).
>
> Two-dimensional rectilinear phased array 100 offers an improvement over one-dimensional linear array 10 in that phased array 100 is separated and/or divided into a plurality of discrete transducers 102 extending in both the X and Z directions. Accordingly, formation of scanning beam 106 can take place in both the X-Y plane (i.e., the azimuth-depth plane) and the Z-Y plane (i.e., the elevation-depth plane). This enables three-dimensional control of scanning beam 106 with respect to *focal depth*, steering angle, and focal geometry. (Emphasis added).

For example, as can be seen from these passages, the transducer array may be configured for electronic scanning in the X direction and to *produce focal points and/or zones "F_{1-3}" at varying levels and/or depths* in both the X-Y and Z-Y planes. In particular, the array may be configured to produce focal zones at *desirable depths*, where the focal zones may include one of uniform-sized focal zones, increasing sized and/or diverging focal zones, or decreasing sized and/or converging focal zones as illustrated in FIG. 7-9. Accordingly, Applicants respectfully request that the Examiner reconsider and remove the §112 rejections of claims 1-4 and 7-17.

Furthermore, the Examiner pointed out that claim 12 is dependent upon a cancelled claim. Applicants respectfully submit that claim 12 has been suitably amended to correct its dependency. Hence, Applicants respectfully request that the Examiner reconsider and remove the §112 rejections of claim 12.

Rejections Under 35 U.S.C. §102

Claims 1-4, 7, 11, 13-23, 33 and 37 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,089,096 (hereinafter "Alexandru"). Claim 1, 18 and 37 are independent. All of the recited claims are believed to be patentable as cited below.

Claims 1, 18 and 37 and Claims Depending Therefrom.

The Examiner argued that Alexandru shows a two-dimensional imaging array having variable focusing abilities in both the azimuthal and elevational directions and an adjustable aperture.

Alexandru fails to teach a two-dimensional imaging array having variable focusing abilities in *both* the azimuthal and elevational directions.

Applicants have carefully reviewed Alexandru and reiterate that Alexandru fails to teach a two-dimensional imaging array having variable focusing abilities in *both* the *azimuthal and elevational directions*. Support for Applicants' assertion may be found in passages of Alexandru found at col. 7, lines 22-30 and lines 59-66:

> By interconnecting the elements 22 in the adjacent rows (rows 0 and 1) of the same column (M), the effective element height of the center row (r=0) is increased which *reduces the focusing ability in the elevational plane* and thereby, increases the elevation phase error. This phase error can be kept small enough to still *improve elevation focusing* with the proper choice of element height, *mechanical focus depth* and zone depth, namely by keeping the elevation "f-number" of the connected elements large. (Emphasis added).
>
> * * *
>
> The interconnection of all the rows (N) of each column (M) *eliminates elevational focusing* of the aperture 24 and therefore, the *elevation focusing* in each column is provided *only by the mechanical elevational focusing, such as a lens or element shaping*, the total element height controlled by how many elements in the column are connected together, and in one implementation of the invention by elevational apodization. (Emphasis added).

As can be seen from these passages, Alexandru fails to manipulate the transducer elements in an elevational direction to focus the beam in the elevation plane. In contrast, Alexandru teaches changing the pattern of the energized elements 22 for each imaging

zone to permit the number of beamformer channels 19 required to operate the aperture 24 to be reduced by switching or reallocating the beamformer channels from one element to another element of the array when switching between imaging zones. Also, to further reduce the number of beamformer channels 19, the vertically symmetric pairs of elements may be interconnected. Additionally, Alexandru teaches expanding the aperture 24 in the *azimuthal* plane. Furthermore, Applicants submit that Alexandru is silent regarding manipulating the elements in the *elevational* plane.

On the contrary, as recited in the pending claims, the transducer elements are manipulated in *both* the azimuthal and elevational directions. More particularly, the ultrasonic elements are modulated in both the azimuthal and elevational directions to form an ultrasonic scanning beam configured to produce focal zones in an azimuth-depth plane and an elevational-depth plane. Applicants respectfully submit that as described in the specification of the present application, a number of ways are presented in which the transducer elements in the array may be manipulated *both* in the *azimuthal and elevational directions* to form an ultrasonic scanning beam configured to produce focal zones in the azimuth-depth and the elevational directions.

For the reasons summarized hereinabove, Applicants respectfully submit that Alexandru cannot anticipate claims 1, 18 and 37. Accordingly, Applicants respectfully submit that independent claims 1, 18 and 37 and claims depending therefrom are allowable and respectfully request the Examiner to reconsider rejection of the claims.

Rejections Under 35 U.S.C. §103

Claims 34, 36 and 41-42 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Alexandru as applied to claims 1-4, 7, 11, 13-23, 33 and 37-38, and further in view of Applicants' purported admissions.

Claims 8-10 and 27-32 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Alexandru as applied to claims 7 and 18, and further in view of U.S. Patent No. 5,305,756 (hereinafter "Entrekin").

Claims 25-26 and 39-40 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Alexandru as applied to claims 18 and 37, and further in view of U.S. Patent No. 4,890,268 (hereinafter "Smith").

Applicants submit that claims 8-10 depend directly or indirectly on independent claim 1. Accordingly, Applicants request that claims 8-10 are allowable by virtue of their dependency from an allowable base claim, as well as for the subject matter they separately recite. Thus, it is respectfully requested that the rejection of claims 8-10 under 35 U.S.C 103(a) be withdrawn.

Further, claims 25-26, 27-32, 34 and 36 depend directly or indirectly on independent claim 18. Accordingly, Applicants request that claims 25-26, 27-32, 34 and 36 are allowable by virtue of their dependency from an allowable base claim, as well as for the subject matter they separately recite. Thus, it is respectfully requested that the rejection of claims 25-26, 27-32, 34 and 36 under 35 U.S.C 103(a) be withdrawn.

Also, claims 39-40 and 41-42 depend directly or indirectly on independent claim 37. Accordingly, Applicants request that claims 39-40 and 41-42 are allowable by virtue of their dependency from an allowable base claim, as well as for the subject matter they separately recite. Thus, it is respectfully requested that the rejection of claims 39-40 and 41-42 under 35 U.S.C 103(a) be withdrawn.

Conclusion

In view of the remarks and amendments set forth above, Applicants respectfully request allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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